DEVELOPMENT OF A SYSTEM FOR FORECASTING HABITAT AVAILABILITY ON FORESTED LANDS

Proposal Submitted to:

WILDLIFE HABITAT CANADA

New Brunswick Fish and Wildlife Branch
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INTRODUCTION

Forest lands play a major economic and social role in the lives of New Brunswickers. Approximately 85 percent of the total area of the province is productive forest land of which 48 percent is in Crown ownership (Department of Natural Resources, 1981). The processing industry owns approximately 40 percent of private forest land (Watson, 1983).

The forest industry is the province's major industry, generating one job in seven in the economy, accounting for almost one quarter of all goods production and 39 percent of total provincial exports (Watson, 1983). The value and use of forest lands, however, extends beyond associated timber assets. Forest land wildlife species are one of New Brunswick's most important natural resources.

In 1981, 20 percent of N.B. residents over fifteen participated in hunting wildlife. That level of participation was the highest in Canada and twice the national average. The average number of days spent by those engaged in hunting (21.8) was second only to Newfoundland and almost four days above the national average (Filion et al., 1983). Participants reported an average annual expenditure of $480 (Filion et al., 1983) and with approximately 137,000 licence holders (Department of Natural Resources, 1982), that translates into 66 million dollars spent on consumptive wildlife related activities.

Over 90 percent of expenditures were made on efforts to hunt forest land species (extracted from tabular data from the survey on the value of wildlife to Canadians). This high demand for consumptive use of wildlife in New Brunswick has increased since 1981. In 1983 hunting licence sales were 10

percent higher than in 1981. Direct provincial revenues from those sales exceeded two million dollars which, in large part due to increased licence costs, was a 46 percent increase over 1981 revenues.

The value of wildlife to non-consumptive users should not be overlooked. In 1981, 18.2 percent of N.B. residents participated in primary non-consumptive wildlife-related trips or outings (Filion et al., 1983). Average annual expenditures exceeded 40 million dollars (from tabular data).

Intensive forest management activities are forecasted to have a great impact on future forest stand types and their arrangement in space. Future forest structures will, in turn, impact populations of forest land wildlife species and, of course, ultimately the benefits derived by their presence. It is unacceptable to ignore or not account for the impacts of alternative forest management strategies on wildlife habitat or populations. The forest habitat upon which wildlife species depend is indeed dynamic and subject to tremendous alteration. Every year in New Brunswick 65 to 90 thousand hectares of forest land are dramatically altered due to forest harvesting. Approximately 20 thousand hectares are planted per year. There is no doubt that continued harvesting and regeneration will substantially alter forest structure in the future and result in large-scale habitat change.

As a result of somewhat gloomy forecasts with respect to future availability of mature stands, New Brunswick has recognized and acted upon the need for better resource data and information handling capabilities. Coupled with the above has been a commitment towards more intensive forest management and regulation of the harvest so that desired benefits can be sustained. Part of that commitment has been to manage forests with the objective of providing habitat to maintain wildlife populations.

The legislation (Crown Lands and Forests Act) expressly requires integrated management and states that habitat is to be managed for the maintenance of wildlife populations. Ten licensees (major forest companies) have signed Forest Management Agreements (FMA) requiring them to plan and execute tasks in forest resource management, including wildlife habitat activities, according to standards outlined in the Forest Management Manual (FMM). These standards include guidelines relative to regulation of harvesting of trees and wildlife considerations.

The words in the Crown Lands and Forests Act (that habitat is to be managed for the maintenance of wildlife populations) assume: 1) that desired population levels are known and; 2) that relationships between habitat and populations have been defined. However, neither the population levels nor the habitat relationship has been well defined for any species.

So, despite progressive legislation, an appropriate administrative structure and the means to manage through standards for forest practices, there is no clear (quantitative) definition of habitat or of habitat goals. This lack of quantification is the major constraint on true management (designed intervention to realize stated objectives or benefits) of wildlife habitat on forest lands. Problems in the current approach are uncertainty in future habitat structure, or populations it can support and, directly resulting from a lack of measurable goals, inability to hold resource managers (Licensees) accountable for habitat management. What is needed is definition (quantification) of the amount and type of habitat required to support defined population (and utilization) objectives. Following that, an implementable habitat control procedure to direct on-the-ground forest management activities towards creating and/or maintaining that required habitat.

PROJECT GOALS

Presently, the tools and information are in place to carry out analyses of future supply of habitat, much like analyses of supply of merchantable stands are made with respect to forest management. The Department of Natural Resources is carrying out a forest development survey (FDS) which classifies stands on the basis of: 1) their expected development or growth pattern and; 2) their current stage of development. Stand classification includes information on tree species, maturity (or current development stage), vertical and horizontal stand structure, silvicultural treatments and site.

The FDS information is being put on a geographic information system which permits analyses not only of descriptive aspects of the resource (component stands in the forest), but also the spatial or locational distribution of stand (or habitat) types. Individual stand development can be forecast (which collectively makes up forest development) and it is possible to test different harvest scheduling options in time and space to gauge the impact of alternative strategies (interventions at the stand level) on both habitat and wood supply (consequences at the forest level).

The habitat management question is now restated as being how to use descriptive (attribute) and spatial (geographic) forest resource information to quantify specific habitat types in a way that is relatable to specific populations. Secondly, how to quantitatively predict the consequences of alternative strategies for forest harvest scheduling in time and space. Harvest schedule strategies automatically alter habitat structure and if the objective is to control habitat, then harvests must be controlled through some set of rules. Any such set of rules must have some basis in an understanding of forest harv-

esting and impacts on supply of habitat.

The objective of this Wildlife Habitat Canada project is to develop a habitat supply forecasting system. The system will incorporate knowledge of forest land species habitat requirements, N.B. forest development survey classifications, a geographic information system and forest growth and harvest modeling procedures. The system will be used to aid in the determination of strategies to be employed by Licensees in management of Crown forest lands. Fish and Wildlife Branch has an objective of having such a system in place by 1987, when Licensees are scheduled to renew their Forest Management Agreements.

PROJECT BACKGROUND AND IMPLEMENTATION

The approach outlined for habitat management in the Blue Mountains of Oregon (Thomas, 1979) provides the most promising basis for evaluating habitat for forest land species across large forested areas. The U.S. Forest Service is now adapting the approach for other national forests. The approach is based on the premise that habitat needs can be summarized as reproductive and feeding requirements of species or species groups and that these can be linked with plant communities (species associations) and their successional stages (current development stage). Through definition of this association the forest manager can translate standard forest information into information on wildlife habitats.

The Blue Mountains approach provides a systematic method for evaluating wildlife habitat at the forest level using forest inventory-type classifications. While it does not achieve the objectives of this project (it does not combine habitat classifications with forest growth models), it does provide the most comprehensive habitat analysis system available and a logical starting point, or springboard, towards more complex analyses.

Since 1977, the Department of Natural Resources has been using forest growth simulators to forecast forest development and analyse supply of merchantable stands. The wood supply analysis procedure is described by Hall (1978) and others (Baskerville, 1978; Clifford, 1981; Erdle, 1984). Results of wood supply analyses are applied in N.B. forest management. The FMA signed by Licensees specify forest harvest rates and silvicultural strategies as determined through forest growth forecasting. The challenge remains to define habitat, forecast it's availability and determine appropriate forest management

strategies for fulfillment of wildlife objectives. Until this is done and strategies can be incorporated into FMA, wildlife habitat activities in forestry will continue to be constraint-type, site-specific actions that lack real direction.

The Crown lands managed under the ten FMA represent 48 percent of productive forest lands in New Brunswick. Habitat supply analyses would be done in cooperation with Licensees to enable them to carry out responsibilities in habitat management. Discussions regarding this proposal have taken place with one of the larger Licensees (Fraser Inc.) and a letter of support is provided in Appendix I.

This proposal has four major components including: 1) development of a data base on habitat requirements of wildlife species; 2) coordination of habitat management efforts by DNR Regions (field staff) and Licensees; 3) update and analysis of deer wintering area habitat data and; 4) quantification of habitat objectives for forested lands through a habitat supply analysis procedure.

1) DATA BASE

An individual is required to build up a data base on N.B. forest wildlife species and their habitat requirements. Habitat requirements will have to be defined in terms of FDS classifications. A structure for this data base will have to be devised on the data base management package which forms part of the geographic information system on the Department's Prime computer. Time frame for data base development is two years. Partial completement should, however, facilitate preliminary habitat supply analyses to be done within three months of project initiation.

2) COORDINATION

Habitat management efforts by DNR Regions and Licensees require improved coordination and consistency. Licensees need improved direction in development of Operating Plans (5-year plans submitted annually). DNR needs improved consistency in the plan assessment and approval process. Operational delivery of a new system will be facilitated by a phase-in process which requires liaison with DNR field staff and Licensees. Resources and time frame for this component also one person for two years.

3)DEER WINTERING AREAS

White-tailed deer is N.B.'s most important species. Currently, the data base on deer wintering habitat is out of date. Aerial surveys and analyses of stand types utilized (for predictive applications) are sorely needed. At the requested level of support (and with supplementary effort by DNR) an inventory for Crown lands should be completed in two field seasons. However, appropriate winter weather and snow conditions are a prerequisite to a successful inventory of this type. Required resources are indicated in the Cost of Project section.

4) HABITAT SUPPLY ANALYSES

Based on defined habitat requirements, habitat supply analyses will be conducted on the ten Crown Licenses. These will be done in conjunction with wood supply analyses done by Timber Management Branch (DNR) which will determine management strategies to be specified in 1987 25-year FMA. Analyses will be conducted by existing DNR staff with the aid of staff specified to be employed through Wildlife Habitat Canada funds.

Table 1 oulines a work schedule and activities covered

by the Wildlife Habitat Canada project.

Table 1. Work schedule for habitat management activities

Project Component	Activities	Time Frame - Accomplishments
Data Base	Develop Data Base Structure	3 months
	Define Habitat Requirements (approx 50 mammals, 250+ bird species)	3 months (some species) 2 years to completion
Coordination	Assess Licensee Operating Plans (10 plans '85-86, 10 plans '86-87)	Report on '85-86 plans one-year after initiation
	Assess Regional Approval Process (5 Regions)	Final report after 2 years with recommendations re-
	Liaise with Regional and Licensee staff re- new system	operational application of system
Deer Wintering Areas	Aerial and Ground Survey	Jan-Mar 86 - Jan-Mar 87
	Maps Produced	Completed April '87
Habitat Supply Analysis	Develop Habitat Supply Analysis Procedure	One year after initiation
	Conduct Habitat Supply Analyses on 10 Licenses	Completed 1987
	Recommendations re- FMA	

DESCRIPTION OF FUTURE MANAGEMENT NEEDS

In the face of uncertainty there becomes a need for an adaptive management strategy (wherein managers can learn from and adapt appropriately to mistakes) (Baskerville, 1984). In the context of this project this starts with quantitative goal definition. This requires definition of habitat requirements of N.B. forest land species and specification of desired habitat availability.

The next step in adaptive management is design of a system forecasting tool wherein the links amongst the goals, the cause-effect dynamics and possible management actions are explicitly stated. In this case a habitat supply (forest dynamics)/population model. Using this tool, a strategy, or set of actions, will be designed to regulate the forest system towards defined goals. The strategy will be implemented and monitored with respect to: 1) the cause-effect relationships defined in the forecasting tool and; 2) performance or progress towards the objective. Adaptations must be made in the light of any error or, perhaps, a change in objectives. A new set of actions will be designed and the process cycles through again.

To achieve such a framework several requirements need to be in place. These include, in part, the activities specified in this proposal. In addition adaptive management requires testing assumed relationships between habitat and populations as well as predicted impacts of interventions. The activities outlined will result in the development of a number of hypotheses which will need to be tested. This will require funds for experimental design and research efforts. Wildlife Habitat Canada may wish to play a role in such activities.

COST OF PROJECT

The level of support requested from Wildlife Habitat Canada is $88,000 per year for two years. A breakdown of funds according to activities is provided on the following page. Fish and Wildlife Branch and DNR Regions will supply support equipment (vehicles,snowmobiles,snowshoes,etc.) for DWA ground survey activities. Fish and Wildlife Branch will oversee the project and is dedicating a project leader (salary and expenses $35,000) towards these forest management activities. A terminal has been purchased ($1,500) for access to Timber Management Branch's geographic information system (GIS). There will not be charges for computer time (DNR owns the system). Direct Fish and Wildlife Branch contribution towards can be considered to be $37,000. Indirectly, if use of new dynamic resource data (FDS) and information handling capability (GIS) is considered, investment by NBDNR towards those activities totals over $1,000,000. The primary objective of that investment has been, however, to resolve problems relating to wood supply.

ANNUAL BUDGET

Species Habitat Data Base	
Wildlife Biologist	$23,000
Subtotal	$23,000
Coordination with Regions and Licenssees	
Wildlife Biologist	23,000
Expenses	5,000
Subtotal	28,000
Survey of Deer Wintering Areas	
Aerial Survey	
2 aircraft at $80/hr. for 25 hours each	4,000
20 mandays at $80.00 during Feb.-March	1,600
Subtotal	5,600
Ground Survey	
280 mandays at $80.00 during Jan.,Feb.,Mar.	22,400
Expenses	2,600
Subtotal	25,000
Map Production	
80 mandays at $80.00 during April	6,400
GRAND TOTAL	$88,000

BACKGROUND OF SPONSORING AGENCY

The primary function of the Fish and Wildlife Branch is to provide central guidance and coordination of protection and wise utilization of fish and wildlife resources within the Province of New Brunswick. To fulfill its role, the Branch recommends fish and wildlife resource legislation and regulations, plans and formulates fish and wildlife resource use, supervises and monitors all fish and wildlife management programs, provides expertise for environmental impact studies, and supervises the provincial fish-rearing facilities.

The objectives for the Fish and Wildlife Management Function are addressed through four programs: Fisheries Management, Wildlife Management, Protection, and Support Services. Objectives within the Wildlife Management program which relate to this proposal and require Wildlife Habitat Canada support include: 1) to quantify habitat requirements to support estimated provincial population levels of deer, moose and bear; 2) to identify habitat requirements for other wildlife species; 3) to develop standards, procedures and a schedule to update the inventory of key habitat sites such as deer wintering areas and; 4) to develop standards and procedures relative to forest use and management that will provide habitat to support population objectives and ensure the continued existence of all species.

LITERATURE CITED

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APPENDIX I

Letter of Support

Fraser Inc.
Edmundston, New Brunswick E3V 1S9
Telephone (506) 735-5551

fraser

February 28, 1985.

Department of Natural Resources
Fish and Wildlife Branch
349 King Street
P. O. Box 6000
FREDERICTON, N. B.
E3B 5H1

Attention: J. R. Patch

Dear Jeff:

We have reviewed your proposal on Habitat Forecasting, submitted to Habitat Canada, and find the philosophy and concepts compatible with the approach advocated by Fraser Inc. As such, we would be very interested in cooperating with your project and we would offer our Crown and Freehold management area as a test site.

Irrespective of the test site, we would like to discuss the design and development of this project with you in the near future.

Sincerely,

Martin S. Litchfield
Superintendent,
Forest Development and Planning

MSL/nm